Business white paper

Network performance

Expand your business capabilities with HP 10GbE adapters featuring Broadcom technology

Table of contents

3 Preface

4 Higher large block I/O performance (throughput)

5 Converged network and storage data protocol offload

6 Lower processor utilization for processing networking load

7 Higher small packet performance (frames per second)

8 Conclusion

Preface

As the deployment of bandwidth-intensive applications such as public and private cloud computing continues to increase, IT administrators are turning to 10 Gigabit Ethernet (10GbE) technology for cost-effective and flexible methods of addressing growing network traffic demands. A key component of the 10GbE network is the network adapter with network protocol processing offload capabilities for optimized host processor utilization. HP 10GbE FlexibleNetwork Adapters by Broadcom allow servers to fully leverage the available 10GbE bandwidth, while minimizing processor utilization. As a result, 10GbE end-to-end performance is comparable to more specialized and costlier cloud-based data center server-to-fabric interconnects. With 10GbE, organizations can expand application capabilities, increase scalability, and improve responsiveness to address dynamic business environments.

As a leading provider of high-performance Ethernet solutions, HP is offering the world's fastest 10GbE networking solution for its Generation 8 (Gen8) family of ProLiant BL, DL, ML, and SL servers. Using Broadcom's NetXtreme II BCM57810S controller, the portfolio of HP 10GbE FlexibleNetwork Adapters provides the highest throughput, lowest processor utilization, and the highest small packet performance for Ethernet connectivity. HP 10GbE FlexibleNetwork Adapters, using NetXtreme II technology, are listed in Table 1 and a summary of the adapters' key advantages is noted in Table 2.

Table 1. HP FlexibleNetwork 10GbE Adapters powered by Broadcom NetXtreme™ II technology

Server type	Adapter photo	Adapter description	Product details
DL, SL, and ML Rack and Tower Servers (NICs)		HP 10Gb 2-port SFP+ CN1100R CNA	• 10 GbE/2 ports • Form factor: stand-up card (NIC) • Controller: Broadcom BCM57810S • HP P/N: QW990A
		HP Ethernet 10Gb 2-port 530T Adapter	• 10GBASE-T/2 ports • Form factor: stand-up card (NIC) • Controller: Broadcom BCM57810S • HP P/N: 656596-B21
DL and SL Rack Servers (FlexibleLOM Rack)		HP FlexFabric 10Gb 2-port 534FLR SFP+ CNA	• 10GbE/2 ports • Form factor: FlexibleLOM for rack • Controller: Broadcom BCM57810S • HP P/N: 700751-B21
		HP FlexFabric 10GBASE-T 2-port 533FLR-T Adapter	• 10GbE/2 ports • Form factor: FlexibleLOM for rack • Controller: Broadcom BCM57810S • HP P/N: 700759-B21
BL Blade Servers (FlexibleLOM and Mezzanine Cards)		HP FlexFabric 10Gb 2-port 534FLB CNA	• 10GbE/2 ports • Form factor: FlexibleLOM Blade • Controller: Broadcom BCM57810S • HP P/N: 700741-B21
		HP FlexFabric 10Gb 2-port 534M CNA	• 10GbE/2 ports • Form factor: mezzanine adapter • Controller: Broadcom BCM57810S • HP P/N: 700748-B21

Table 2. Key advantages of HP 10GbE FlexibleNetwork Adapters powered by Broadcom

Performance	Description	Benchmark	Benefits
Maximum throughput	Line-rate throughput across both ports—demonstrated over 37,000 Mb/s	Linux Chariot	• Support more data streams • Reduce content quality degradation
Storage protocol processing	• 2.5M FCoE IOPS • 1.5M iSCSI IOPS	Linux Chariot	• Hardware offload frees up CPU resources • Combines network and storage data on one simplified infrastructure
Processor utilization	Superior processor utilization of less than 15%	Linux Chariot	• Increase asset utilization • Reduce energy costs • Improve business productivity
Small packet performance	Simultaneously send and receive 5.7 million packets per second	Linux RFC 2544	• Support more concurrent requests • Service more requests/second • Reduce network congestion

Higher large block I/O performance (throughput)

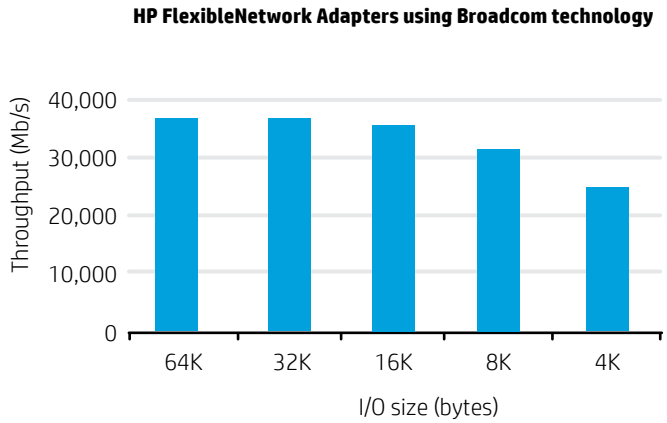
Applications that require maximum throughput for cloud computing include streaming video and audio, large data transfers between servers, load-balancing, failover, high-resolution graphics, database, and backup. However, data centers architected using a traditional three-layer hierarchical structure are not well suited for cloud environments. In a hierarchical structure, when performance improvements are needed, more servers are simply added. Even though the inherent limitations of this architecture—scalability, cost, and complexity—are evident, organizations reluctantly continue to use this approach. Economics, or in simpler terms "costs," often dictate the level of performance optimization that can be implemented using the traditional architecture. This usually translates into less than optimal performance and scalability enhancements. While the three-layer architecture may have been sufficient with past computing models, it can no longer effectively nor efficiently support emerging public and private cloud computing models without creating operational, performance, and scaling challenges.

As a result, there has been an emerging shift in data center design, moving away from the traditional vertically oriented multi-tier architecture—tailored for north-south data traffic toward a new simpler, flatter, and meshed architecture model. This architecture is suited for server-to-server (east-west) communication within the data center itself. The result is the ratio of local traffic between servers within the data centers to incoming/outgoing traffic is projected to reach four to one by 2015 (reference: Cisco Cloud Index). Simply put, with an "east-west" architecture, the intra-data center (server-to-server) communication will significantly increase. Therefore, deployment of a high-performance networking infrastructure is critical. For greater resource allocation agility and cost effectiveness, data centers will allocate resources dynamically across large server pools where any server could be assigned to any service at any time. Key requirements to enable deployment of this new data center architecture are network availability, bandwidth, and performance. Therefore deploying the right hardware to provide sufficient network capacity on the server edge is critical—the greater the server's data throughput capabilities the better the network will perform.

This is where the HP ProLiant Gen8 Server 10GbE FlexibleNetwork adapters powered by the Broadcom BCM57810S controller come into play. The BCM57810S has demonstrated greater large block I/O networking performance, delivering line-rate performance up to 37,000 Mb/s.[1] See Chart 1 for details.

[1] As shown in Chart 1 at 64K block size.

Chart 1
Throughput (Mb/s) vs. I/O size (bytes)



Converged network and storage data protocol offload

Converging application data and storage data onto the same network simplifies the installation and management of the network infrastructure. As shown in Charts 2 and 3 below, Broadcom based CNAs deliver the highest performance for FCoE and iSCSI protocol processing with efficient hardware offload that frees up the server CPU resources for applications processing.

Chart 2
FCoE performance

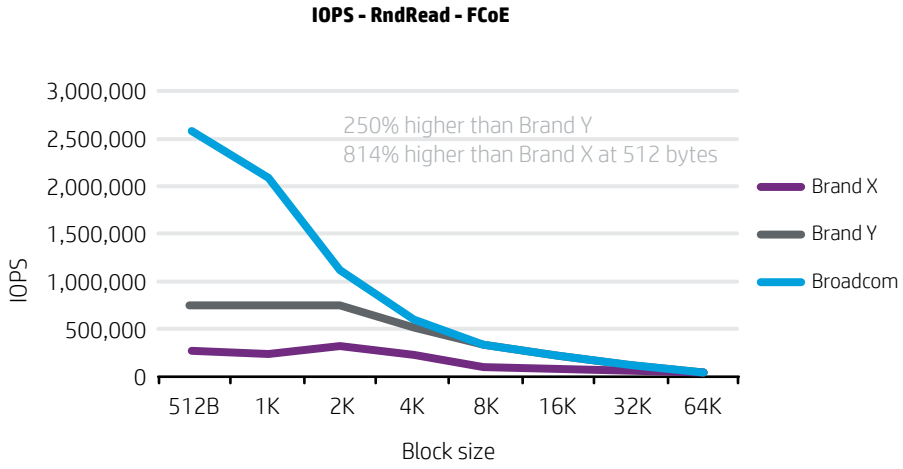


Chart 3
iSCSI performance

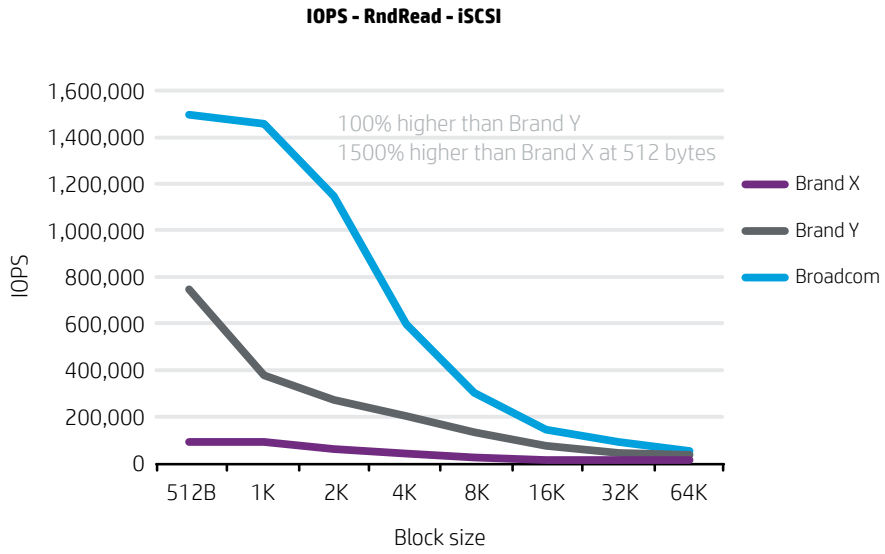
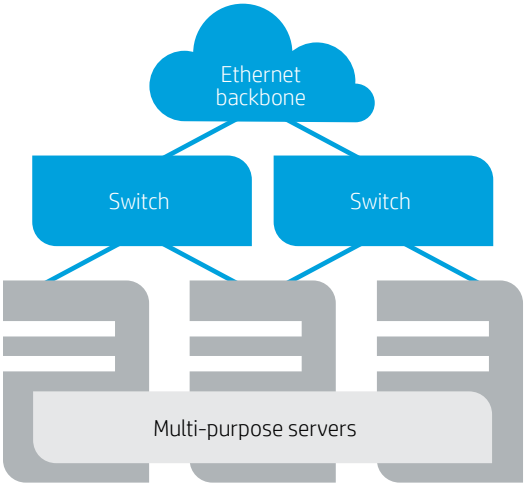


Figure 1
Flat (east/west) architecture for the public and private cloud data center



Lower processor utilization for processing networking load

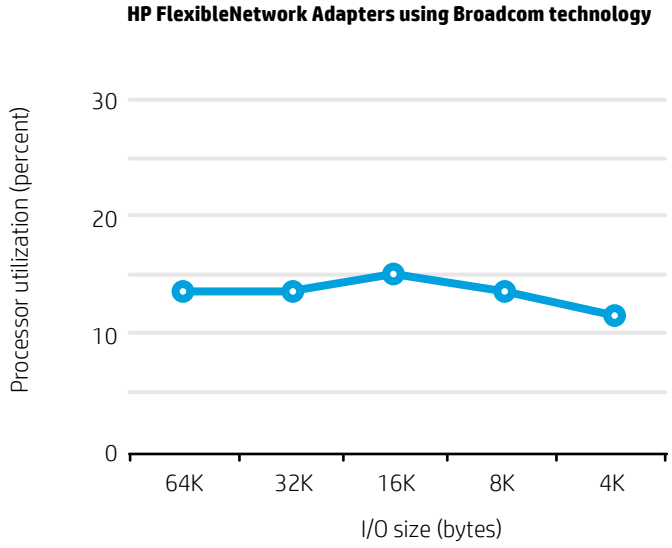
Data center operational costs have a significant impact on businesses and IT administrators are consistently tasked to reduce costs and increase asset utilization. Traditionally, data center servers used were dedicated, which meant they were over-provisioned and under-utilized.

HP 10GbE FlexibleNetwork Adapters powered by the Broadcom BCM57810S improve processor utilization (less than 15%) through a combination of hardware and stateless offload features (See Chart 4). They are available in a range of form factors including PCIe NIC, mezzanine cards, and the innovative HP FlexibleLOM (See Table 1).

However, the benefits of HP FlexibleNetwork Adapters using the NetXtreme II offload features go beyond just improving performance and workload processing. These features also help reduce energy consumption.

It is well known that data center power and cooling costs are increasing rapidly. Even if cost is not an issue, sourcing of energy is becoming an issue as the data center's insatiable appetite for energy continues to grow. This is especially true for data centers of cloud computing providers. Therefore, businesses are looking into all avenues to mitigate and curb growing energy costs. The energy required by the server pools is the biggest component of the energy and cost equation. This is once again where the HP family of 10GbE FlexibleNetwork adapters using the Broadcom BCM57810S can play an important role in helping to keep energy costs in check. By offloading network-related processes from the processor, the BCM57810S provides additional server processor cycles. This, in turn, allows more applications to be supported by a fewer number of servers and processors.

Chart 4
Processor utilization (percent) vs. I/O size (bytes)



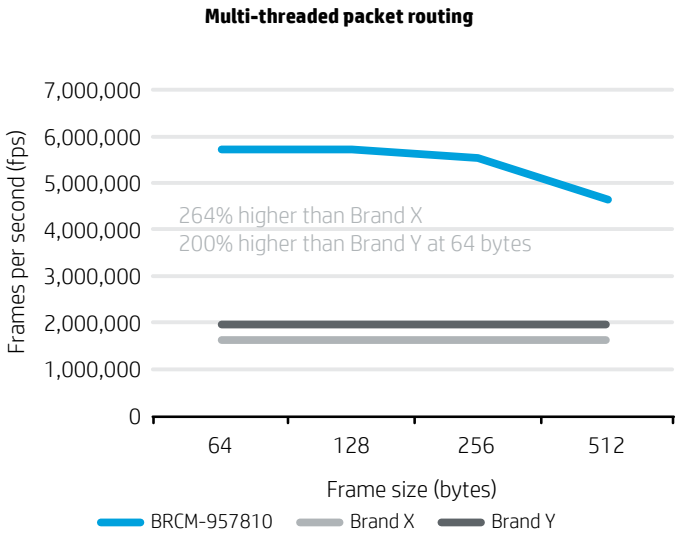
Higher small packet performance (frames per second)

Applications that require high small packet performance for cloud computing include inter-node messaging traffic, database with small fields and small packet updates, voice over IP (VoIP), routing applications, financial services trading, game servers, and Web servers with small messaging services.

The HP portfolio of 10GbE FlexibleNetwork adapters using the Broadcom BCM57810S has demonstrated and delivered superior small packet performance of 5.7 million packets per second (Chart 5). See Table 2 for details.

HP ProLiant Gen8 Servers configured with HP FlexibleNetwork Adapters by Broadcom enable IT administrators to optimize server small packet performance.

Chart 5
Frames per second (fps) vs. frame size (bytes)



Conclusion

As cloud services transform long-standing business models and global economies, Ethernet's usage will dramatically increase as it is the most ubiquitous, time-tested networking technology with the broadest adoption and deployment. Much of the world's data transfer begins and ends with an Ethernet connection. IT professionals who are looking for higher capacity and higher performance solutions can rely on the HP ProLiant Gen8 Servers with HP 10GbE FlexibleNetwork Adapters that utilize the Broadcom BCM57810S NetXtreme II controller to deliver the highest levels of performance.

The portfolio of HP enterprise 10GbE adapters extend Ethernet's proven value set and economics to public and private cloud-based mega data centers providing:

- The highest performance combined with lowest processor utilization
- The lowest total cost of ownership (infrastructure/operational/human capital)
- A seamless migration from 1GbE to higher performance 10GbE server-to-fabric connectivity
- A streamlined network management
- A market-proven Ethernet architecture

Learn more at
go.broadcom.com/HPGen8.

Sign up for updates
hp.com/go/getupdated

Share with colleagues

Rate this document

4AA4-0230ENW, September 2013, Rev. 3